ENVIRONMENTAL PROTECTION COMMISSION[567]

Notice of Intended Action

Twenty-five interested persons, a governmental subdivision, an agency or association of 25 or more persons may demand an oral presentation hereon as provided in Iowa Code section 17A.4(1)*"b."*

Notice is also given to the public that the Administrative Rules Review Committee may, on its own motion or on written request by any individual or group, review this proposed action under section 17A.8(6) at a regular or special meeting where the public or interested persons may be heard.

The following amendments are proposed.

ITEM 1. Amend 567—135.2(455B) by adding the following definitions:

"*Asbestos-cement pipe*" (AC) means a pipe or conduit constructed of asbestos fiber, Portland cement, and water, which can be used to transport water.

"*Backflow preventer*" means a check valve used to ensure water flows in one direction, designed to prevent contamination from an end user, such as a home, from getting into the general water supply. An approved backflow preventer shall be a reduced pressure backflow preventer or an anti-siphon device which complies with the standards of the American Water Works Association and has been approved by the Foundation for Cross-Connection Control and Hydraulic Research University.

"*Cast iron pipe*" means a pipe or conduit used as a pressure pipe for transmission of water, gas, and sewage, and as a water drainage pipe. It comprises predominantly a gray cast iron tube historically used uncoated, with newer types having various coating and linings to reduce corrosion and improve hydraulics.

"*Ductile iron pipe*" means a pipe or conduit commonly used for potable water distribution and pumping of sewage. The predominant wall material is ductile iron, a spheroidized graphite cast iron, commonly with an internal cement mortar lining to inhibit corrosion from the carried water and various types of external coatings to inhibit corrosion from the environment.

"*Gasket*" means any type of pipe seals made of a variety of rubbers including but not necessarily limited to styrene-butadiene rubber (SBR), nitrile-butadiene rubber (NBR or nitrile), ethylene propylene diene monomer (EPDM), neoprene (CR), and fluoroelastomer rubber (FKM), which are used to seal pipe connections.

"*Polybutylene pipe*" (PB) means a water supply pipe comprised of a form of plastic resin that was used extensively from 1978 until 1995. The piping systems were used for underground water mains and as interior water distribution piping. Polybutylene mains are usually blue in color, but may be gray, black, or white. The pipe is usually 1/2 inch or 1 inch in diameter, and it may be found entering a residence through the basement wall or floor, concrete slab or through the crawlspace; frequently it enters the residence near the water heater.

"*Polyethylene pipe*" (PE) means a water supply pipe comprised of thermoplastic material produced from the polymerization of ethylene. PE plastic pipe is manufactured by extrusion in sizes ranging from ½ inch to 63 inch. PE is available in rolled coils of various lengths or in straight lengths up to 40 feet. PE pipe is available in many forms and colors including single extrusion colored or black pipe, black pipe with co-extruded color striping, and black or natural pipe with a co-extruded colored layer. PE pipe has been demonstrated to be very permeable to petroleum while still retaining its flexible structure.

"*Polyvinyl chloride pipe*" (PVC) means a pipe made from a plastic and vinyl combination material. The pipes are durable, hard to damage, and long lasting. A PVC pipe is very resistant and does not rust, nor is it likely to rot or wear over time. PVC piping is most commonly used in water systems, underground wiring, and sewer lines.

"*Portland cement*" means hydraulic cement (cement that not only hardens by reacting with water but also forms a water-resistant product) and is produced by pulverizing clinkers consisting essentially of hydraulic calcium silicates, usually containing one or more forms of calcium sulfate as an inter ground addition.

"*Service line*" means a pipe connected to a business or residence from a water main, typically of a size not exceeding 6 inches in diameter, and including its gaskets and other appurtenances. For purposes of this rule, service lines refer to pipes specifically for drinking water transmission.

"*Water line*" means a hollow cylinder or tubular conduit that is constructed of non-earthen materials including but not limited to asbestos-cement, copper, high-density polyethylene (HDPE), polybutylene, polyethylene, and wood that routinely contains and conveys potable water. Such piping includes any elbows, couplings, unions, valves, or other in-line fixtures, as well as the gaskets, which contain and convey potable water.

"*Water main pipe*" means a main line to the water distribution system with feeder lines or service lines connected to it and which typically is of 6 inches or greater in diameter, and including its gaskets and other appurtenances.

ITEM 2. Amend 567—135.2(455B) by revising the following definitions as follows:

"Groundwater to ~~plastic~~ water line pathway" means a pathway through groundwater which leads to a ~~plastic~~ water line.

"Soil to ~~plastic~~ water line pathway" means a pathway which leads from soil to a ~~plastic~~ water line.

ITEM 3. Amend paragraph 135.9 (1) "a" and "Tier 1 Look-Up Table" as follows:

a. Pathway assessment. The pathways to be evaluated at Tier 1 are the groundwater ingestion pathway, soil leaching to groundwater pathway, groundwater vapor to enclosed space pathway, soil vapor to enclosed space pathway, soil to ~~plastic~~ water line pathway, groundwater to ~~plastic~~ water line pathway and the surface water pathway. Assessment requires a determination of whether a pathway is complete, an evaluation of actual and potential receptors, a determination of whether conditions are satisfied for obtaining no further action clearance for individual pathways, or for obtaining a complete site classification of "no action required." A pathway is considered complete if a chemical of concern has a route which could be followed to reach an actual or potential receptor.

Iowa Tier 1 Look-Up Table

~~Media~~	~~Exposure Pathway~~	~~Receptor~~	~~Group 1~~				~~Group 2: TEH~~	
			~~Benzene~~	~~Toluene~~	~~Ethylbenzene~~	~~Xylenes~~	~~Diesel*~~	~~Waste Oil~~
~~Groundwater (ug/L)~~	~~Groundwater Ingestion~~	~~actual~~	~~5~~	~~1,000~~	~~700~~	~~10,000~~	~~1,200~~	~~400~~
		~~potential~~	~~290~~	~~7,300~~	~~3,700~~	~~73,000~~	~~75,000~~	~~40,000~~
	~~Groundwater Vapor to Enclosed Space~~	~~all~~	~~1,540~~	~~20,190~~	~~46,000~~	~~NA~~	~~2,200,000~~	~~NA~~
	~~Groundwater to Plastic Water Line~~	~~all~~	~~290~~	~~7,300~~	~~3,700~~	~~73,000~~	~~75,000~~	~~40,000~~
	~~Surface Water~~	~~all~~	~~290~~	~~1,000~~	~~3,700~~	~~73,000~~	~~75,000~~	~~40,000~~
~~Soil (mg/kg)~~	~~Soil Leaching to Groundwater~~	~~all~~	~~0.54~~	~~42~~	~~15~~	~~NA~~	~~3,800~~	~~NA~~
	~~Soil Vapor to Enclosed Space~~	~~all~~	~~1.16~~	~~48~~	~~79~~	~~NA~~	~~47,500~~	~~NA~~
	~~Soil to Plastic Water Line~~	~~all~~	~~1.8~~	~~120~~	~~43~~	~~NA~~	~~10,500~~	~~NA~~

Media	Exposure Pathway	Receptor	Group 1				Group 2: TEH	
			Benzene	Toluene	Ethylbenzene	Xylenes	Diesel*	Waste Oil
Groundwater (µg/L)	Groundwater Ingestion	Actual	5	1,000	700	10,000	1,200	400
		Potential	290	7,300	3,700	73,000	75,000	40,000
	Groundwater Vapor to Enclosed Space	All	1,540	20,190	46,000	NA	2,200,000	NA
	Groundwater to Water Line	PVC or Gasketed Mains	7,500	6,250	40,000	48,000	75,000	40,000
		PVC or Gasketed Service Lines	3,750	3,120	20,000	24,000	75,000	40,000
		PE/PB/AC	200	3,120	3,400	19,000	75,000	40,000
	Surface Water	All	290	1,000	3,700	73,000	75,000	40,000
Soil (mg/kg)	Soil Leaching to Groundwater	All	0.54	42	15	NA	3,800	NA
	Soil Vapor to Enclosed Space	All	1.16	48	79	NA	47,500	NA
	Soil to Water Line	All	2.0	3.2	45	52	10,500	NA

NA: Not applicable. There are no limits for the chemical for the pathway, because for groundwater pathways the concentration for the designated risk would be greater than the solubility of the pure chemical in water, and for soil pathways the concentration for the designated risk would be greater than the soil concentration if pure chemical were present in the soil.

TEH: Total Extractable Hydrocarbons. The TEH value is based on risks from naphthalene, benzo(a)pyrene, benz(a)anthracene, and chrysene. Refer to Appendix B for further details.

Diesel*. Standards in the Diesel column apply to all low volatile petroleum hydrocarbons except waste oil.

ITEM 4. Amend paragraph 135.9 (3) “g” as follows:

g. A receptor survey including but not limited to the following: existing buildings, enclosed spaces (basements, crawl spaces, utility vaults, etc.), conduits (gravity drain lines, sanitary and storm sewer mains and service lines), ~~plastic~~ water lines and other utilities within 500 feet of the source. For conduits and enclosed spaces, there must be a description of construction material, conduit backfill material, slope of conduit and trenches (include flow direction of sewers), burial depth of utilities or subsurface enclosed spaces, and the relationship to groundwater elevations.

ITEM 5. Amend paragraph 135.9 (8) as follows:

135.9(8) *Groundwater to ~~plastic~~ water line pathway assessment.* This pathway addresses the potential for creating a drinking water ingestion risk due to contact with ~~plastic~~ water lines and causing infusion to the drinking water.

ITEM 6. Amend paragraphs 135.9 (8) “a”, “c”, and “d” as follows:

a. *Pathway completeness and receptor evaluation.*

(1) Actual receptors. This pathway is considered complete for an actual receptor if there is an existing ~~plastic~~ water line within 200 feet of the source and the first encountered groundwater is less than 20 feet below ground surface.

(2) Potential receptors. This pathway is considered complete for a potential receptor if the first encountered groundwater is less than 20 feet below ground surface.

c. *Utility company notification.* The utility company which supplies water service to the area must be notified of all actual and potential ~~plastic~~ water line impacts as soon as knowledge of a potential risk is determined. ~~Notification of potential plastic water line impacts may be postponed until completion of Tier 2 if a Tier 2 assessment is required.~~

d. *Corrective action response.*

(1) For actual receptors, if the Tier 1 levels are exceeded for this pathway, all ~~plastic~~ water lines within 200 feet must be replaced with ~~nonplastic lines~~ water line materials and gasket materials of appropriate construction as per current department standards with no less than nitrile or FKM gaskets or as otherwise approved by the department or the ~~plastic~~ water lines must be relocated beyond the 200-foot distance from the source. A Tier 2 assessment must be conducted for this pathway if lines are not replaced or relocated.

(2) For potential receptors, upon utility company notification, no further action will be required for this pathway.

ITEM 7. Amend paragraph 135.9 (9) as follows:

135.9(9) *Soil to ~~plastic~~ water line pathway assessment.* This pathway addresses the potential for creating a drinking water ingestion risk due to contact with ~~plastic~~ water lines and infusion into the drinking water.

ITEM 8. Amend paragraphs 135.9 (9) “a”, “c”, and “d” as follows:

a. Pathway completeness <u>and receptor evaluation</u>.

(1) Actual receptors. This pathway is considered complete for an actual receptor if a ~~plastic~~ water line exists within 200 feet of the source.

(2) Potential receptors. This pathway is always considered complete for potential receptors.

c. *Utility company notification.* The utility company which supplies water service to the area must be notified of all actual and potential ~~plastic~~ water line impacts<u> as soon as knowledge of a potential risk is determined.</u> ~~The utility company which supplies water service to the area must be notified of all actual and potential plastic water line impacts. Notification of potential plastic water line impacts may be postponed until completion of Tier 2 if a Tier 2 assessment is required.~~

d. *Corrective action response.* For actual receptors, if the Tier 1 levels are exceeded for this pathway, <u>all water lines within 200 feet must be replaced with water line materials and gasket materials of appropriate construction as per current department standards with no less than nitrile or FKM gaskets or as otherwise approved by the department or the water lines must be relocated beyond the 200-foot distance from the source.</u> ~~the plastic water lines may be replaced with nonplastic lines of the plastic lines must be relocated to a distance beyond 200 feet of the source.~~ Excavation of soils to below Tier 1 levels may be undertaken in accordance with 135.9(7) *“h.”* If none of these options is implemented, a Tier 2 assessment must be conducted for this pathway.

ITEM 9. Amend paragraph 135.10 (3) “i” and “k” as follows:

i. Special procedure for the groundwater to ~~plastic~~ water line pathway.

(1) Target level. The applicable target level is the Tier 1 level for ~~plastic~~ <u>the specific type of</u>

water line.

(2) High risk classification. A site designated as granular or nongranular bedrock shall be classified high risk for this pathway if the highest groundwater elevation is higher than three feet below the bottom of a ~~plastic~~ water line as provided in 135.10(8)*"a"*(1), risk classification cannot be determined as provided in 135.12(455B) due to limitations on placement of monitoring wells, and ~~plastic~~ water lines exist within 200 feet of a monitoring well which exceeds the Tier 1 level.

k. *High risk corrective action response.* Owners and operators have the option to conduct a Tier 3 assessment in accordance with 135.11(455B).

(1) Groundwater ingestion pathway. For high risk sites, where soil exceeds the soil leaching to groundwater Tier 1 level for actual receptors, soil excavation or other active remediation of soils must be conducted in accordance with department guidance to reduce soil concentrations below the soil leaching Tier 1 level. Corrective action other than monitoring of groundwater is required at sites designated as nongranular bedrock if the actual receptor has been or is likely to be impacted. Corrective action other than monitoring of groundwater is required at sites designated as granular bedrock if the actual receptor has been impacted or the sentry well required by 135.10(3)*"g"*(4) has been impacted above Tier 1 levels. Acceptable corrective action for impacted or vulnerable groundwater wells may include active remediation, technological controls, institutional controls, well plugging, relocation, and well reinstallation with construction measures sufficient to prevent contaminant infiltration to the well and to prevent formation of a preferential pathway.

(2) Groundwater ingestion pathway high risk monitoring. For high risk sites designated as nongranular or granular bedrock, if the soil concentrations do not exceed the soil leaching to groundwater Tier 1 levels or have been reduced to this level by corrective action, and corrective action of groundwater is not required as in subparagraph (1), these sites shall be subject to groundwater monitoring as provided in paragraph *"l."* Corrective action other than monitoring of groundwater is required at sites designated as granular bedrock if groundwater concentrations exceed the applicable target level less than 200 feet from an actual receptor. Reevaluation of the potential for impact to actual receptors is required at sites designated as nongranular bedrock if concentrations from monitoring wells increase more than 20 percent of the previous samples.

<u>(3) For water line pathways. For high risk sites, active remediation must be conducted to</u>

reduce concentrations below the applicable target levels, or water lines and gaskets must be replaced or relocated, including the use of institutional and technological controls. If lines are polybutylene, polyethylene, or asbestos-cement, the lines must be removed or relocated. For all lines, if replacement is conducted, they must be replaced with water line materials and gasket materials of appropriate construction as per current department standards with no less than nitrile or FKM gaskets or as otherwise approved by the department.

(~~3~~4) Other pathways. For high risk sites other than groundwater ingestion and water lines, active remediation must be conducted to reduce concentrations below the applicable target levels including the use of institutional and technological controls.

ITEM 10. Amend paragraph 135.10 (5) "a" as follows:

a. *General.* The soil leaching to groundwater pathway is evaluated using a one-dimensional model which predicts vertical movement of contamination through soil to groundwater and transported by the groundwater to a receptor. The model is used to predict the maximum concentrations of chemicals of concern that would be present in groundwater beneath a source which is representative of residual soil contamination and maximum soil concentrations. The predicted groundwater concentrations then must be used as a groundwater source concentration to evaluate its impact on other groundwater transport pathways, including the groundwater ingestion pathway, the groundwater vapor pathway, the groundwater ~~plastic~~ water line pathway and the surface water pathway.

ITEM 11. Amend paragraph 135.10 (8) as follows:

135.10(8) *Groundwater to ~~plastic~~ water line pathway assessment.*

ITEM 12. Amend paragraphs 135.10(8) "a", "b", "d", "e", and "f" as follows:

a. *Pathway completeness and receptor evaluation.*

(1) Actual receptors include all ~~plastic~~ water lines where the highest groundwater elevation is higher than three feet below the bottom of the ~~plastic~~ water line at the measured or predicted points of exposure. The highest groundwater elevation is the estimated average of the highest measured groundwater elevations for each year. All ~~plastic~~ water lines must be evaluated for this pathway regardless of distance from the source and regardless of the Tier 1 evaluation, if the

lines are in areas with actual data above the applicable Tier 1 level and modeled data above the SSTL line. If actual data exceeds modeled data, then all ~~plastic~~ water lines are considered actual receptors if they are within a distance extending 10 percent beyond the edge of the contaminant plume defined by the actual data.

(2) Potential receptors include all areas where the first encountered groundwater is less than 20 feet deep and where actual data or modeled data are above Tier 1 levels.

(3) The point(s) of exposure is the ~~plastic~~ water line, and the points of compliance are monitoring wells between the source and the ~~plastic~~ water line which would be effective in monitoring whether the line has been or may be impacted by chemicals of concern.

b. *Plume definition.* If this pathway is complete for an actual receptor, the groundwater plume must be defined to the Tier 1 levels, with an emphasis between the source and any actual ~~plastic~~ water lines. The water inside the ~~plastic~~ water lines shall be analyzed for all chemicals of concern.

d. *Pathway classification.* Upon completion of analysis of field data and modeled data, the pathway must be classified high risk, low risk or no further action as provided in 135.12(455B). The water quality inside the ~~plastic~~ water lines is not a criteria for clearance of this pathway.

e. *Utility company notification.* The utility company which supplies water service to the area must be notified of all actual and potential ~~plastic~~ water line impacts as soon as knowledge of a potential risk is determined. If the extent of contamination has been defined, this information must be included in utility company notification, and any previous notification made at Tier 1 must be amended to include this information.

f. *Corrective action response.*

(1) For actual receptors, unless the pathway is classified as no further action, corrective action for this pathway must be conducted as provided in 135.12(455B). If the concentrations of chemicals of concern in a water line exceed the Tier 1 levels for actual receptors for the groundwater ingestion pathway, immediate corrective action must be conducted to eliminate exposure to the water, including but not limited to replacement of the line with an approved ~~nonplastic~~ material.

(2) For potential receptors, upon utility company notification, no further action will be required for this pathway for potential receptors.

ITEM 13. Amend paragraph 135.10 (9) as follows:

135.10(9) *Soil to ~~plastic~~ water line pathway assessment.*

ITEM 14. Amend paragraphs 135.10 (9) "a", "c", "d", and "e" as follows:

a. Pathway completeness and receptor evaluation.

(1) Actual receptors include all ~~plastic~~ water lines within ten feet of the soil plume defined to the Tier 1 level. All ~~plastic~~ water lines must be evaluated for this pathway regardless of distance from the source, if the lines are in areas where Tier 1 levels are exceeded.

(2) Potential receptors include all areas where Tier 1 levels are exceeded.

c. Target level. The point(s) of exposure include all areas within ten feet of the ~~plastic~~ water line. The target level at the point(s) of exposure is the Tier 1 level.

d. Pathway classification. Upon completion of analysis of field data ~~and modeled data~~, the pathway must be classified high risk, low risk or no further action as provided in 135.12(455B). Measurements of water quality inside the ~~plastic~~ water lines may be required, but are not allowed as criteria to clear this pathway.

e. Utility company notification. The utility company which supplies water service to the area must be notified of all actual and potential ~~plastic~~ water line impacts as soon as knowledge of the potential risk is determined. If the extent of contamination has been defined, this information must be included in utility company notification, and any previous notification made at Tier 1 must be amended to include this information.

ITEM 15. Amend paragraph 135.12 (1) as follows:

135.12(1) *General.* 1995 Iowa Code section 455B.474(1)*"d"*(2) provides that sites shall be classified as high risk, low risk and no action required. Risk classification is accomplished by comparing actual field data to the concentrations that are predicted by the use of models. Field data must be compared to the simulation model which uses the maximum concentrations at a source and predicts at what levels actual or potential receptors could be impacted in the future. Field data must also be compared to the site-specific target level line which assumes a target level concentration at the point of exposure and is used to predict the reduction in concentration that must be achieved at the source in order to meet the applicable target level at the point of exposure. These models not only predict concentrations at points of exposure or a point of compliance at a source but also predict a distribution of concentrations between the source and the point of exposure which may also be points of compliance. The comparison of field data with these distribution curves primarily is considered for purposes of judging whether the modeled data is reasonably predictive and what measures such as monitoring are prudent to determine the reliability of modeled data and actual field data.

For the soil vapor to enclosed pathway and soil to ~~plastic~~ water line pathways, there are no horizontal transport models to use predicting future impacts. Therefore, for these pathways, sites are classified as high risk, low risk or no action based on specified criteria below and in 135.10(455B).

ITEM 16. Amend paragraph 135.12 (2) “a” as follows:

a. For the soil vapor to enclosed space and soil to ~~plastic~~ water line pathways, sites shall be classified as high risk if the target levels for actual receptors are exceeded as provided in 135.10(7) and 135.10(9).

ITEM 17. Amend paragraphs 135.12 (3) “b” through “i” as follows:

b. For the groundwater to water line and soil to water line receptors, these objectives are achieved by active remediation, replacement or relocation from areas within the actual plume plus some added site-specific distance to provide a safety factor to areas outside the site-specific target level line. In areas of free product, all water lines regardless of construction material must be relocated unless there is no other option and the department has approved an alternate plan of construction. If water lines and gaskets are replaced in an area of contamination, they must be replaced with water line materials and gasket materials of appropriate construction as per current department standards with no less than nitrile or FKM gaskets or as otherwise approved by the department. If a service line is replaced and remains in a contaminated area, a backflow preventer shall be installed to prevent impacts to the larger water distribution system.

~~*b.*~~c. For the soil vapor pathway ~~and soil to plastic water line~~, these objectives are achieved by active remediation of soil contamination below the target level at the point(s) of exposure or other designated point(s) of compliance using the same measurement methods for receptor evaluation under 135.10(7) and 135.10(9).

~~*c.*~~*d.* For a site classified as high risk or reclassified as high risk for the soil leaching to groundwater ingestion pathway, these objectives are achieved by active remediation of soil contamination to reduce the soil concentration to below the site-specific target level at the source.

~~*d.*~~*e.* A corrective action design report (CADR) must be submitted by a certified groundwater professional for all high risk sites unless the terms of a corrective action plan are formalized in a memorandum of agreement within a reasonable time frame specified by the department. The CADR must be submitted on a form provided by the department and in accordance with department CADR guidance within 60 days of site classification approval as provided in 135.10(11). The CADR must identify at least two principally applicable corrective action options designed to meet the objectives in 135.12(3), an outline of the projected timetable and critical performance benchmarks, and a specific monitoring proposal designed to verify its effectiveness and must provide sufficient supporting documentation consistent with industry standards that the technology is effective to accomplish site-specific objectives. The CADR must contain an analysis of its cost-effectiveness in relation to other options. The department will review the CADR in accordance with 135.12(9).

~~*e.*~~*f. Interim monitoring.* From the time a Tier 2 site cleanup report is submitted and until the department determines a site is classified as no action required, interim monitoring is required at least annually for all sites classified as high risk. Groundwater samples must be taken: (1) from a monitoring well at the maximum source concentration; (2) from a transition well, meaning a monitoring well with detected levels of contamination closest to the leading edge of the groundwater plume as defined to the pathway-specific target level, and between the source(s) and the point(s) of exposure; and (3) from a guard well, meaning a monitoring well between the source(s) and the point(s) of exposure with concentrations below the SSTL line. If a receptor is located within an actual plume contoured to the applicable target level for that receptor, the point of exposure must be monitored. If concentrations at the receptor already exceed the applicable target level for that receptor, corrective actions must be implemented as soon as practicable. Monitoring conducted as part of remediation or as a condition of establishing a no action required classification may be used to the extent it meets these criteria. Soil monitoring is required at least annually for all applicable pathways in accordance with 135.12(5)*"d."*All drinking water wells and non-drinking water wells within 100 feet of the largest actual plume (defined to the appropriate target level for the receptor type) must be tested annually for chemicals of concern. Actual plumes refer to groundwater plumes for all chemicals of concern.

~~*f.*~~*g.* Remediation monitoring. Remediation monitoring during operation of a remediation system is required at least four times each year to evaluate effectiveness of the system. A remediation monitoring schedule and plan must be specified in the corrective action design report and approved by the department.

~~*g.*~~*h.* Technological controls. The purpose of a technological control is to effectively sever a pathway by use of technologies such that an applicable receptor could not be exposed to chemicals of concern above an applicable target risk level. Technological controls are an acceptable corrective action response either alone or in combination with other remediation systems. The purpose of technological controls may be to control plume migration through use of containment technologies, barriers, etc., both as an interim or permanent corrective action response or to permanently sever a pathway to a receptor. Controls may also be appropriate to treat or control contamination at the point of exposure. Any technological control proposed as a permanent corrective action option without meeting the reduction in contaminant concentrations objectives must establish that the pathway to a receptor will be permanently severed or controlled. The effectiveness of a technological control must be monitored under a department approved plan until concentrations fall below the site-specific target level line or its effectiveness as a permanent response is established, and no adverse effects are created.

~~*h.*~~*i.* Following completion of corrective action, the site must meet exit monitoring criteria to be reclassified as no action required as specified in 135.12(6)~~*"b."*~~ *"c".* At any point where an institutional or technological control is implemented and approved by the department, the site may be reclassified as no action required consistent with 135.12(6).

ITEM 18. Amend paragraphs 135.12 (5) "a" and "d" as follows:

a. Purpose. For sites or pathways classified as low risk, the purpose of monitoring is to determine if concentrations are decreasing such that reclassification to no action required may be appropriate or if the contaminant plume is stable, such that reclassification to no action required can be achieved with implementation of an institutional control per 135.12(8), or if concentrations are increasing above the site-specific target level line such that reclassification to high risk is appropriate. Monitoring is necessary to evaluate impacts to actual receptors and assess the continued status of potential receptor conditions. Low risk monitoring shall be conducted and reported by a certified groundwater professional.

d. Soil monitoring.

(1) For the soil vapor to enclosed space pathway potential receptors, soil gas samples must be taken at a minimum of once per year in the area(s) of expected maximum vapor concentrations where an institutional control is not in place.

(2) For the soil leaching to groundwater pathway potential receptors, annual groundwater monitoring is required for a minimum of three years as provided in *"c"* above. If groundwater concentrations are below the applicable SSTL line for all three years~~ and a final soil sample taken from the source shows no significant vertical movement~~, no further action is required. If groundwater concentrations exceed the applicable SSTL line in any of the three years, corrective action is required to reduce soil concentrations to below the Tier 1 levels for soil leaching to groundwater. Therefore, annual monitoring of soil is not applicable.

(3) For the soil to ~~plastic~~ water line pathway potential receptors, notification of the utility company is required. Notification will result in reclassification to no action required. Therefore, annual monitoring of soil is not applicable.

ITEM 19. Amend paragraphs 135.12 (6) "b" and "c", and add "f" and "g" as follows:

b. For initial classification, groundwater pathways shall be classified as no action required if the field data is below the site-specific target level line and all field data is at or less than the simulation line, and confirmation monitoring has been completed successfully. Confirmation sampling for groundwater ~~and soil~~ is a second sample which confirms the no action required criteria.

c. For reclassification from high or low risk, a pathway shall be classified as no action required if all field data is below the site-specific target level line and if exit monitoring criteria have been met, <u>except as provided in 135.12(6)g</u>. Exit monitoring criteria means the three most recent consecutive groundwater samples from all monitoring wells must show a steady or declining trend and the most recent samples are below the site-specific target level line. Other criteria include the following: The first of the three samples for the source well and transition well must be more than detection limits; concentrations cannot increase more than 20 percent from the first of the three samples to the third sample; concentrations cannot increase more than 20 percent of the previous sample; and samples must be separated by at least six months.

f. Prior to acceptance of a request to classify the site 'no action required', and in the event there is a question of validity of the data or sampling methods, laboratory analysis procedures, indication of plume movement, or the department obtains information about new conditions at the site, the department may conduct or require the owner to conduct confirmation sampling of the soil, groundwater, soil gas, or indoor vapor to confirm the 'no action required' criteria have been met.

g. The department may waive, at its discretion, the exit monitoring criteria based on a certified groundwater professional's written justification to support a 'no action required' classification for the site based on a reasoned assessment of data, trends, receptor status, and corrective actions performed. One example is when steady and declining criteria have not been met due solely to variations among laboratory's lowest achievable detection limits.

ITEM 20. Amend **567—135.14(455B) Action levels** as follows:

567—135.14(455B) Action levels. The following corrective action levels apply to petroleum regulated substances as regulated by this chapter. These action levels shall be used to determine if further corrective action under 135.6(455B) through 135.12(455B) or 135.15(455B) is required as the result of tank closure sampling under 135.15(3) or other analytical results submitted to the department. The contaminant concentrations must be determined by laboratory analysis as stated in 135.16(455B). Final cleanup determination is not limited to these contaminants. The contamination corrective action levels are:

	Soil (mg/kg)	**Groundwater (ug/L)**
Benzene	0.54	5
Toluene	~~42~~ 3.2	1,000
Ethylbenzene	15	700
Xylenes	~~No limit~~ 52	10,000
Total Extractable	3,800	1,200

Hydrocarbons

ITEM 21 Amend Appendix A – Tier 1 Table as follows:

Appendix A - Tier 1 Table, Assumptions, Equations and Parameter Values

Iowa Tier 1 Look-Up Table

~~Media~~	~~Exposure Pathway~~	~~Receptor~~	~~Group 1~~				~~Group 2: TEH~~	
			~~Benzene~~	~~Toluene~~	~~Ethylbenzene~~	~~Xylenes~~	~~Diesel*~~	~~Waste Oil~~
~~Groundwater (ug/L)~~	~~Groundwater Ingestion~~	~~actual~~	~~5~~	~~1,000~~	~~700~~	~~10,000~~	~~1,200~~	~~400~~
		~~potential~~	~~290~~	~~7,300~~	~~3,700~~	~~73,000~~	~~75,000~~	~~40,000~~
	~~Groundwater Vapor to Enclosed Space~~	~~all~~	~~1,540~~	~~20,190~~	~~46,000~~	~~NA~~	~~2,200,000~~	~~NA~~
	~~Groundwater to Plastic Water Line~~	~~all~~	~~290~~	~~7,300~~	~~3,700~~	~~73,000~~	~~75,000~~	~~40,000~~
	~~Surface Water~~	~~all~~	~~290~~	~~1,000~~	~~3,700~~	~~73,000~~	~~75,000~~	~~40,000~~
~~Soil (mg/kg)~~	~~Soil Leaching to Groundwater~~	~~all~~	~~0.54~~	~~42~~	~~15~~	~~NA~~	~~3,800~~	~~NA~~
	~~Soil Vapor to Enclosed Space~~	~~all~~	~~1.16~~	~~48~~	~~79~~	~~NA~~	~~47,500~~	~~NA~~
	~~Soil to Plastic Water Line~~	~~all~~	~~1.8~~	~~120~~	~~43~~	~~NA~~	~~10,500~~	~~NA~~

Media	Exposure Pathway	Receptor	Group 1				Group 2: TEH	
			Benzene	Toluene	Ethylbenzene	Xylenes	Diesel*	Waste Oil
Groundwater (µg/L)	Groundwater Ingestion	Actual	5	1,000	700	10,000	1,200	400
		Potential	290	7,300	3,700	73,000	75,000	40,000
	Groundwater Vapor to Enclosed Space	All	1,540	20,190	46,000	NA	2,200,000	NA
	Groundwater to Water Line	PVC or Gasketed Mains	7,500	6,250	40,000	48,000	75,000	40,000
		PVC or Gasketed Service Lines	3,750	3,120	20,000	24,000	75,000	40,000
		PE/PB/AC Mains or Service	200	3,120	3,400	19,000	75,000	40,000
	Surface Water	All	290	1,000	3,700	73,000	75,000	40,000
Soil (mg/kg)	Soil Leaching to Groundwater	All	0.54	42	15	NA	3,800	NA
	Soil Vapor to Enclosed Space	All	1.16	48	79	NA	47,500	NA
	Soil to Water Line	All	2.0	3.2	45	52	10,500	NA

NA: Not applicable. There are no limits for the chemical for the pathway, because for groundwater pathways the concentration for the designated risk would be greater than the solubility of the pure chemical in water, and for soil pathways the concentration for the designated risk would be greater than the soil concentration if pure chemical were present in the soil.

TEH: Total Extractable Hydrocarbons. The TEH value is based on risks from naphthalene, benzo(a)pyrene, benz(a)anthracene, and chrysene. Refer to Appendix B for further details.

Diesel*: Standards in the Diesel column apply to all low volatile petroleum hydorcarbons except waste oil.

Assumptions Used for Iowa Tier 1 Look-Up Table Generation

1. Groundwater ingestion pathway. The maximum contaminant levels (MCLs) were used for Group 1 chemicals. The target risk for carcinogens for actual receptors is 10-6 and for potential receptors is 10-4. A hazard quotient of one, and residential exposure and building parameters are assumed.

2. Groundwater vapor to enclosed space pathway. Residential exposure and residential building parameters are assumed; no inhalation reference dose is used for benzene; the capillary fringe is assumed to be the source of groundwater vapor; and the hazard quotient is 1 and target risk for carcinogens is 1x10-4.

3. Groundwater to ~~plastic~~ water line. This pathway uses the same assumptions as the groundwater ingestion pathway for potential receptors, including a target risk for carcinogens of 10-4.

4. Surface water. This pathway uses the same assumptions as the groundwater ingestion pathway for potential receptors, including a target risk for carcinogens of 10-4, except for toluene which has a chronic level for aquatic life of 1,000 as in the definition for surface water criteria in 567—135.2.

5. Soil leaching to groundwater. This pathway assumes the groundwater will be protected to the same levels as the groundwater ingestion pathway for potential receptors, using residential exposure and a target risk for carcinogens of 10-4.

6. Soil vapor to enclosed space pathway. The target risk for carcinogens is 1x10-4; the hazard quotient is 1; no inhalation reference dose is used for benzene; residential exposure factors are assumed; and the average of the residential and nonresidential building parameters are assumed.

7. Soil to ~~plastic~~ water line pathway. This pathway uses the soil leaching to groundwater model with nonresidential exposure and a target risk for carcinogens of 10-4

In addition to these assumptions, the equations and parameter values used to generate the Iowa Tier 1 Look-Up Table are described below.

ITEM 22 Amend Appendix B as follows:

Appendix B - Tier 2 Equations and Parameter Values

All Tier 1 equations and parameters apply at Tier 2 except as specified below.

Diesel and Waste Oil

Diesel and Waste Oil			Chemical-Specific Values for Tier 1			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	150	0.012	0.12	1.2
		potential	150	1.2	12.0	NA
	Groundwater Vapor to Enclosed Space	all	4,440	NA	NA	NA
	Groundwater to ~~Plastic~~ Water Line	all	150	1.2	12.0	NA
	Surface Water	all	150	1.2	12.0	NA
Soil (mg/kg)	Soil Leaching to Groundwater	all	7.6	NA	NA	NA
	Soil Vapor to Enclosed Space	all	95	NA	NA	NA
	Soil to ~~Plastic~~ Water Line	all	21	NA	NA	NA

Due to difficulties with analytical methods for the four individual chemicals listed in the above table, Total Extractable Hydrocarbon (TEH) default values were calculated for each chemical, using the assumption that diesel contains 0.2% napthalene, 0.001% benzo(a)pyrene, 0.001% benz(a)anthracene, and 0.001% chrysene. Resulting TEH Default Values are shown in the following table.

Diesel			TEH Default Values			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	75,000	1,200	12,000	120,000
		potential	75,000	120,000	1,200,000	NA
	Groundwater Vapor to Enclosed Space	all	2,200,000	NA	NA	NA
	Groundwater to ~~Plastic~~ Water Line	all	75,000	120,000	1,200,000	NA
	Surface Water	all	75,000	120,000	1,200,000	NA
Soil (mg/kg)	Soil Leaching to Groundwater	all	3,800	NA	NA	NA
	Soil Vapor to Enclosed Space	all	47,500	NA	NA	NA
	Soil to ~~Plastic~~ Water Line	all	10,500	NA	NA	NA

The lowest TEH default value for each pathway (shown as a shaded box) was used in the Tier 1 Table.
Due to difficulties with analytical methods for the four individual chemicals, Total Extractable Hydrocarbon (TEH) default values were calculated for each chemical, using the assumption that waste oil contains no naphthalene, 0.003% benzo(a)pyrene, 0.003% benz(a)anthracene, and 0.003% chrysene. Resulting TEH Default Values are shown in the following table.

Waste Oil			TEH Default Values			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
Groundwater (ug/L)	Groundwater Ingestion	actual	NA	400	4,000	40,000
		potential	NA	40,000	400,000	NA
Groundwater (ug/L)	Groundwater Vapor to Enclosed Space	all	NA	NA	NA	NA
	Groundwater to ~~Plastic~~ Water Line	all	NA	40,000	400,000	NA
	Surface Water	all	NA	40,000	400,000	NA
Soil	Soil Leaching to	all	NA	NA	NA	NA

Waste Oil			TEH Default Values			
Media	Exposure Pathway	Receptor	Naphthalene	Benzo(a) pyrene	Benz(a) anthracene	Chrysene
(mg/kg)	Groundwater					
	Soil Vapor to Enclosed Space	all	NA	NA	NA	NA
	Soil to ~~Plastic~~ Water Line	all	NA	NA	NA	NA

The lowest TEH default value for each pathway (shown as a shaded box) was used in the Tier 1 Table.

ITEM 23 Amend Appendix B by adding to end of appendix as follows:

Appendix B - Tier 2 Equations and Parameter Values

Water Line Calculations

Explanation of Target Levels

for Petroleum Fuel-Derived BTEX Compounds in Groundwater and Soil

GROUNDWATER

PVC or Gasketed Mains

Benzene: 7,500 µg/L
Gasoline-saturated groundwater was considered to be an extreme condition of environmental contamination and that it was unacceptable to leave water lines, regardless of material, in contact with this level of benzene contamination. While Ong et al. (2008) showed that gasoline-saturated groundwater would not pose a significant risk of permeation exceeding the 5 µg/L MCL for benzene of gasketed DI or PVC water mains, a safety factor of $1/8^{th}$ was applied to the level of benzene in premium gasoline-saturated water determined by Ong et al. (2008). A ½ safety factor was compounded for each of four potential safety risks: material defects in the pipe (= 1/2), presence of service line taps (= 1/4), stagnation of water (= 1/6), and water line breaks (= 1/8). This was an average of 67.5 mg/L ± 4.9 mg/L for multiple preparations of gasoline-saturated water and was rounded to 60.0 mg/L to conservatively account for the statistical uncertainty. Hence,

$$Target\ Level = \frac{1}{8} \times 60{,}000\ \mu g/L = 7{,}500\ \mu g\ /L\ benzene$$

Toluene: 6,250 µg/L
The target level for toluene was determined similarly to that for benzene. The level of benzene in premium gasoline-saturated water determined by Ong et al. (2008) to be 56.2 mg/L ± 4.9 mg/L and conservatively rounded to 50.0 mg/L. Hence,

$$Target\ Level = \frac{1}{8} \times 50{,}000\ \mu g/L = 6{,}250\ \mu g\ /L\ toluene$$

Ethylbenzene: 40,000 ug/L
The target level was set to be double that for PVC or Gasketed Service Lines (20,000 µg/L – see below).

Total Xylenes: 48,000 ug/L

The target level was set to be double that for PVC or Gasketed Service Lines (24,000 µg/L – see below).

PVC or Gasketed Service Lines

Benzene: 3,750 µg/L
The target level was set to be one half of that for PVC or Gasketed Mains (7,500 µg/L as above) since services tend to be of higher risk than mains owing to their smaller diameter and greater potential for stagnation.

Toluene: 3,120 µg/L
Similar to benzene, the target level was set to be one half of that for PVC or Gasketed Mains (6,250 µg/L as above) since services tend to be of higher risk than mains owing to their smaller diameter and greater potential for stagnation. Odd-even rounding to 3 significant figures was applied.

Ethylbenzene: 20,000 µg/L
The target level was based on two observations by Ong et al. (2008): 1) premium gasoline-saturated water has an average concentration of 3.4 mg/L ethylbenzene and 2) ethylene permeates high density polyethylene 46 times slower than does benzene (presumably, this is reasonably representative of other materials such as rubber gaskets). The 1/8 safety factor was also applied, as above. Odd-even rounding to 2 significant figures was applied. Hence:

$$Target\ Level = 3{,}400\ \mu g/L \times 46x \times \frac{1}{8} = 19{,}550\ \ \mu g/L = 20{,}000\ \mu g/L$$

Total Xylenes: 24,000 µg/L
Similar to ethylbenzene, the target level was based on 1) premium gasoline-saturated water has an average concentration of 19 mg/L total xylenes and 2) total xylenes permeate high density polyethylene 10 times slower than does benzene. The 1/8 safety factor was also applied, as above. Odd-even rounding to 2 significant figures was applied. Hence:

$$Target\ Level = 19{,}000\ \mu g/L \times 10x \times \frac{1}{8} = 23{,}750\ \ \mu g/L = 24{,}000\ \mu g/L$$

PE/PB/AC

Benzene: 200 µg/L
The target level was set at the concentration of benzene in groundwater surrounding a 1" HDPE service line (SIDR 9 IPS) that would result in a concentration of 2 µg/L benzene in the service line after a 24 hr stagnation period. This level was chosen because 2 µg/L is generally the minimum reportable concentration of benzene in laboratory reports received by the department.

The permeation rate is a function of the concentration of benzene in the groundwater as described by Ong et al. (2008), equation 3.4a:

$$P_m = 0.0079C_{bulk}^{1.1323}$$

where P_m is the benzene permeation rate in μg/cm^2/day through the pipe described above (cm^2 refers to the inner surface of the pipe) and C_{bulk} is the concentration of benzene in the groundwater (mg/L).

For any length of exposed 1" SIDR 9 IPS pipe, *l* (cm), the concentration in the pipe after 24 hr stagnation, C_{24hr} (μg/L), can be computed from P_m and the ratio of the inner surface of the pipe to the internal volume:

$$C_{24hr} = P_m \times \left(\frac{2\pi rl}{\pi r^2 l/1000}\right) = 0.0079C_{bulk}^{1.1323} \times \frac{2000}{r}$$

where r is the inside radius of the pipe (cm), l is the length of exposed pipe (cm), and dividing by 1000 converts from cm^3 to liters (and, therefore, 2000/r converts μg/cm^2/day to μg/L/day).

Solving for C_{bulk} (mg/L) with C_{24hr} = 2 μg/L and r = 1.28 cm (per manufacturer's specifications):

$$C_{bulk}^{1.1323} = \frac{2 \times 1.28}{0.0079 \times 2000}$$

and

$$C_{bulk} = \sqrt[1.1323]{0.162} = 0.200mg/L = 200\mu g/L$$

While the target level is expressed as 200 μg/L for clarity, the underlying data support only two significant figures. In a stricter treatment of the data this would be expressed as 20 x 10^1 μg/L.

Toluene: 3,120 μg/L
The target level was set to be equal to that for PVC or Gasketed Service Lines. Calculations similar to those used above for benzene (Ong et al. (2008), equation 3.4b) indicate that 3120 μg/L toluene in groundwater would result in 50 μg/L inside a 1" SIDR 9 IPS HDPE pipe after 24 hours of stagnation, which is 1/20th of the 1,000 μg/L MCL for toluene.

Ethylbenzene: 3,400 μg/L
The target level was set to be equal to the concentration of ethylbenzene in premium gasoline-saturated water (see discussion above for PVC or Gasketed Mains/Benzene). Unlike other target levels based on contaminant concentrations in gasoline-saturated water, the 1/8th safety factor was not applied because of the very low permeation rate of ethylbenzene through HDPE, the relatively low solubility of ethylbenzene in water, and the relatively high MCL (700 μg/L). Ong et al. (2008) found that permeation of HDPE by aqueous ethylbenzene was minimal and of no consequence for public health.

Total Xylenes: 19,000 μg/L
The target level was set to be equal to the concentration of ethylbenzene in premium gasoline-saturated water following the same reasoning for ethylbenzene (above). The permeation rate and water solubility are also very low and the MCL is 10,000 μg/L. Ong et al. (2008) found that permeation of HDPE by aqueous xylenes was minimal and of no consequence for public health.

SOIL

Target levels for soil were set to be the same for mains and services of any material discussed above under "Groundwater". The underlying data support two significant figures for target levels in soil. Odd-even rounding was applied where appropriate.

Benzene: 2.0 mg/Kg
The target level was derived from the concentration of benzene (mg/Kg) that would result if soil that was 10% moisture and 1% organic matter was equilibrated with premium gasoline-saturated water (60 mg/L benzene – as per discussion of PVC or Gasketed Mains/Benzene above). The equilibrium concentration in soil was calculated using the approach of Chiou et al. (1983). The $1/8^{th}$ safety factor discussed previously for groundwater was applied. Accordingly:

$$C_T = C_W K_d + C_W \theta$$

where C_T is the total concentration of benzene in soil (mg/Kg), θ is the fraction of moisture in the soil (Kg/Kg), and Kd is the partition coefficient from water to soil (L/Kg). Further:

$$K_d = K_{om} f_{om}$$

where K_{om} is the partition coefficient from water to organic matter in the soil, which is 16.8 L/Kg for benzene in soils with naturally occurring organic matter (Chiou et al. (1983)), and f_{om} is the fraction of organic matter in the dry soil (Kg/Kg).

For soil containing 1% naturally occurring organic matter and 10% moisture, the total concentration of benzene upon exposure to premium gasoline-saturated groundwater (60 mg/L benzene, as per above discussion of PVC or Gasketed Mains) would be:

$$C_T = \left(\frac{60\ mg}{L} \times \left(\frac{16.8\ L}{Kg} \times \frac{0.01\ Kg}{Kg}\right)\right) + \left(\frac{60\ mg}{L} \times \frac{0.1\ Kg}{Kg}\right) = \frac{16\ mg}{Kg}$$

Applying the $1/8^{th}$ safety factor:

$$Target\ Level = \frac{1}{8} \times \frac{16\ mg}{Kg} = \frac{2.0\ mg}{Kg}$$

Toluene: 3.2 mg/Kg
The target level was derived in the same manner as for benzene except that the concentration of toluene in premium gasoline-saturated water is 50 mg/Kg and K_{om} is 42 L/Kg. Accordingly:

$$C_T = \left(\frac{50\ mg}{L} \times \left(\frac{42\ L}{Kg} \times \frac{0.01\ Kg}{Kg}\right)\right) + \left(\frac{50\ mg}{L} \times \frac{0.1\ Kg}{Kg}\right) = \frac{26\ mg}{Kg}$$

and

$$Target\ Level = \frac{1}{8} \times \frac{26\ mg}{Kg} = \frac{3.2\ mg}{Kg}$$

Ethylbenzene: 45 mg/Kg
The target level was based on the target level set for Groundwater/PVC or Gasketed Mains (40,000 µg/L, rounded from 39,100 µg/L, or 39.1 mg/L) and the principles of Chiou et al. (1983) discussed above. In a manner similar to that for benzene in soil, C_W was 3.4 mg/L, Kd was 0.106 L/Kg, and C_T was calculated to be 3.9 mg/Kg. The target level for soil that is equivalent to the target level set for groundwater was calculated as follows:

$$Target\ Level\ mg/Kg = 39.1\ mg/L \times \frac{3.9\ mg/Kg}{3.4\ mg/L} = 45\ mg/Kg$$

Note: The 1/8th safety factor was applied above to the target levels for ethylbenzene and total xylenes for Groundwater/PVC or Gasketed Service Lines, from which the target levels for PVC or Gasketed Mains were derived. Consequently, the 1/8th safety factor has also been applied to the target levels for both ethylbenzene and total xylenes in soil.

Total Xylenes: 52 mg/Kg
The target level was set in the same manner as for ethylbenzene (above), based on the groundwater target level of 48,000 µg/L (rounded from 47.5 mg/L). C_W was 19 mg/L, Kd was 1.001 L/Kg (assuming a mixture of m-, o-, and p-xylenes which is 60%, 20%, and 20%, respectively, which is typical of xylenes derived from petroleum), and C_T was calculated to be 21 mg/Kg. Hence:

$$Target\ Level\ mg/Kg = 47.5\ mg/L \times \frac{21\ mg/Kg}{19\ mg/L} = 52\ mg/Kg$$

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